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To evaluate the efficacy of botanicals and chemical against *Cercospora* leaf spot of Sarpagandha (*Rauvolfia serpentina* L.) Benth Ex Kurz. *in vivo*

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Abstract

Sarpagandha (*Rauvolfia serpentina*) belongs to family *Apocynaceae* is an evergreen, perennialshrub, erect of the height upto 60cm. It's root are tuberous with pale brown colour, leaves of the plant are in whorls of three lanceolate or obovate, bright green in colour, flowers are in irregular, corymbose inflorescence with white and pink colour. Fruits are drupe, single or didymous shining black when fully riped. The minimum percent disease severity was recorded with Neem leaf extract (25.03) followed by botanicals spray, Tulsi leaf extract (27.15), Arjun bark extract (30.46) and Garlic bulb extract (34.66) while, maximum percent disease severity was recorded with Castor bean leaf extract (41.71) as compared to control (76.26). The minimum percent disease severity was recorded with Mancozeb @ 0.25% concentrations (21.77%). The maximum percent control was recorded with Neem leaf extract (67.16%) followed by Tulsi leaf extract (64.81%), Arjun bark extract (59.94%) and Garlic bulb extract (53.20%) while, minimum percent disease control was recorded with botanical spray of Castor bean leaves extract (45.29%). Highest percent disease control was recorded in fungicide with Mancozeb @ 0.25 % (71.53%). The results showed that each plant extract were more or less inhibit disease growth of *Cercospora rauvolfiae*. The effectiveness of the extracts and the maximum disease management was recorded with Neem leaf extract.

Keywords: Mancozeb, Garlic, Sarpagandha

1. Introduction

Sarpagandha (*Rauvolfia serpentina* Benth.) genus name was given in honour of Dr. Leonhard Rauwolf, a 16th century German botanist, Physician & explorer. *Rauvolfia* is originated from South-East Asia. It is distributed in the Tropical region of Africa and America, Tropical Himalaya, Assam, Pegu, India, Java, Tennasserim, Deccan, Peninsula, Bihar, Sri Lanka, Malay Peninsula, Myanmar, Malaysia and Indonesia. In Nepal, it is found in tropical and subtropical regions from east to west along at 100-900m altitude. The roots of Sarpagandha (*Rauvolfia serpentina* Benth.) have been used in India from century they are prominent, tuberous, with pale brown colour usually branched, 0.5 to 2.5 cm in diameter up to 40 to 60 cm deep into soil. The uprooting of root of crop is recommended at winter (November-December). Roots of 16 exploitable sizes are collected 2-3 years after the plantation, but for commercial cultivation harvesting after 15-18 months is ideal, before digging of roots a light irrigation is suggested. 0.1-4.0 kg fresh roots are obtained from 1.5 years old plants. The average dry root yield of *Rauvolfia* was approximately 2-3 ton under average management

when harvested at 30 months. Plants raised from stem cutting yield about 1-2 tons/ha, and the plants from root cutting gives productivity of 3-4 tons/ha.

Sarpagandha (*Rauvolfia serpentina*) belongs to family *Apocynaceae* is an evergreen, perennialshrub, erect of the height upto 60cm. It's root are tuberous with pale brown colour, leaves of the plant are in whorls of three lanceolate or obovate, bright green in colour, flowers are in irregular corymbose inflorescence with white and pink colour. Fruits are drupe, single or didymous shining black when fully riped. The genus name was given in honour of Dr. Leonhard Rauwolf, a 16th century German botanist, Physician & explorer. Sarpagandha (*Rauvolfia serpentina*) is one of the most important medicinal plants distributed in the foot hills of Himalayan range up to an elevation of 1300-1400m and spread almost all over in India. Roots of the plant have been used in the treatment of high blood pressure, hypertension, migraine, neuropsychiatric insomnia.

Sarpagandha crop suffers from number of diseases caused by many fungal pathogens such as *Cercospora rauvolfiae*, *Alternaria tenuis*, *Phoma jolyana*, *Croynespora cassicola*, *Cladosporium oxysporium*, *Alternaria alternata*, *Macrophomina phaseolina*, and *Mycosphaerella rauvolfiae*. Top dying disease caused by *Lasiodiplodia theobromae* f. spp. *rauwolfiae* the fungus infects plant through the root and invades in to the water conducting tissues of the plant. These diseases cause much vegetative loss to the important medicinal crop. Among them *Cercospora* leaf spot causes much vegetative loss to the crop by Chung (2003) [1].

Materials and Methods

The experiment was conducted at main campus of University is located at Kumarganj, Ayodhya Raibareilly Road approximately 42 km away from Ayodhya. Geographically experimental site is situated at 26.47° N latitude, 82.12° E latitude and at on altitudes of 113 meter from sea level in the Gangetic plane zone of North India. The university campus is falling under North Eastern Plain Zone, often subjected to extremes of weather i.e. very hot summers and cold winters. The experimental field had sandy loam, slightly alkaline (pH 8.0) soil, low in organic carbon and nitrogen, medium in phosphorus and potassium. The mechanical composition of soil constituted 64.4 percent sand, 27.8 percent silt and 11.3

percent clay. The leaf, bulb and bark extracts of Neem, Garlic, Castor bean, Tulsi, and Arjun were prepared by cold water extraction method described by Shekhawat and Prasad (1971) [8]. The samples were washed separately in tap water and finally three time washed by changes distilled water. They were crushed in mortar and pestle by adding distilled water @ 2 ml/g fresh weight. The extracts were clarified by passing through two layers of cheese cloth and finally through Whatmann No. 1 filter paper. The filtered extracts were quoted in the study as 100 % extract.

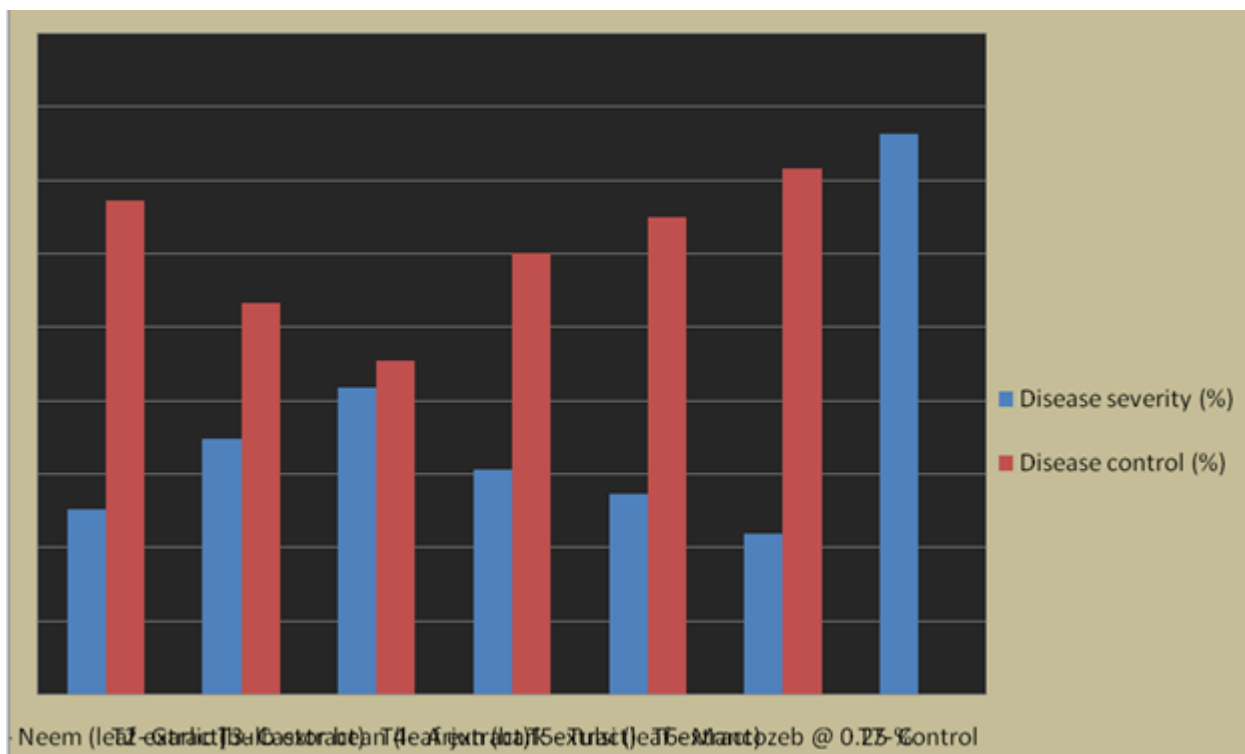
Results and Discussion

During the present investigation, extract of five plants species namely Neem, Garlic, Castor bean; Arjun and Tulsi were effective on fungi toxicity against *Cercospora rauvolfiae* Hegde, Y.R. and Poornima. (2010) [3]. Evaluated plant extracts from different species against different diseases in different crops. Leaf extracts of *Azadirachta indica*, *Ocimum sanctum*, *Polyanthai longifolia* and *Vinca rosea* were reported efficacious against many pathogenic fungi. The minimum percent disease severity was recorded with Neem leaf extract (25.03) followed by botanicals spray, Tulsi leaf extract (27.15), Arjun bark extract (30.46) and Garlic bulb extract (34.66) while, maximum percent disease severity was recorded with Castor bean leaf extract (41.71) as compared to control (76.26). The minimum percent disease severity was recorded with Mancozeb @ 0.25% concentrate ons (21.77%). The maximum percent control was recorded with Neem leaf extract (67.16%) followed by Tulsi leaf extract (64.81%), Arjun bark extract (59.94%) and Garlic bulb extract (53.20%) while, minimum percent disease control was recorded with botanical spray of Castor bean leaves extract (45.29%). Highest percent disease control was recorded in fungicide with Mancozeb @ 0.25 % (71.53%). The results showed that each plant extract were more or less inhibit disease growth of *Cercospora rauvolfiae*. The effectiveness of the extracts and the maximum disease management was recorded with Neem leaf extract. The same results were also found by (Ogbo and Oyibo, 2008). Rao (1986) and Raja Gopal *et al.* (2009), Khander *et al.* (1985) [5, 7, 6, 4], and Gnanamangai and Ponmurugan (2011) [2] also found that Carbendazim was inhibitory to mycelial growth. This is the confirmation to the present findings.

Table 1: Effect of botanicals and fungicide on percent disease severity of leaf spot disease in *Rauvolfia serpentina*

S. No.	Treatment	Percent disease severity
1.	T ₁ - Neem (leaf extract) @ 5%	25.03 (30.01)
2.	T ₂ - Garlic (bulb extract) @ 5%	34.66 (36.06)
3.	T ₃ - Castor bean (leaf extract) @ 5 %	41.71 (40.22)
4.	T ₄ - Arjun (bark extract) @ 5 %	30.46 (33.49)
5.	T ₅ - Tulsi (leaf extract) @ 5 %	27.15 (31.40)
6.	T ₆ - Mancozeb @ 0.25 %	21.77 (27.80)
7.	T ₇ - Control	76.26 (60.85)
	SEm ±	0.49
	CD at (P=0.05)	1.46
	CV %	2.21

Note: Data given in parenthesis are the angular transformed values of percent disease severity.



Graph 1: Effect of botanicals and fungicide on percent disease severity and Percent disease control of leaf spot disease in *Rauwolfia serpentina*

Table 2: Effect of botanicals and fungicide on percent disease control of leaf spot disease in *Rauwolfia serpentina*

S. No.	Treatment	Percent disease control
1.	T ₁ - Neem (leaf extract) @ 5%	67.16 (55.04)
2.	T ₂ - Garlic (bulb extract) @ 5%	53.20 (46.83)
3.	T ₃ - Castor bean (leaf extract) @ 5%	45.29 (42.29)
4.	T ₄ - Arjun (bark extract) @ 5%	59.94 (50.73)
5.	T ₅ - Tulsi (leaf extract) @ 5%	64.81 (53.61)
6.	T ₆ - Mancozeb @ 0.25 %	71.53 (57.76)
7.	T ₇ - Control	0.00 (0.28)
	SEm ±	0.53
	CD at (P=0.05)	1.60
	CV %	2.15

Note: Data given in parenthesis are the angular transformed values of percent disease control.

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